



**{In Archive} Extra Comments for Tom Fontaine**

**David Olszyk** to: Sue Hecht

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Archive:

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Hi Sue,

In addition to what is on the excell spreadsheet, please add the following additional comments for Tom Fontaine. Some of the comments are from others and are unedited, but were modified for the spreadsheet.

Thanks Dave

**ACEXXX Task? McKane Have not seen update**

No comments

**ACE 024 Task 43. Johnson, Biochar.**

I think the google docs submission had 5 FTE and \$600 K per year for 5 years. I think a base effort could be 0.5 to 1.0 FTE and \$100-\$200 K per year may be more realistic. This task is important as it is the only one in ORD specifically dealing with potential effects of land-application of biofuels byproducts (biochar). This type of research is also of great interest to several EPA regions. It also could be of interest to CSS if biochar materials are considered to be toxic.

**ACE 294 Task 30. Klein. Regional Interaction.**

This task now has "0" FTE but is still of interest.

**ACE 078 Task 104 Watrud, Cellulosic Biofuels.**

The FTE and \$ estimates can be modified to be more in context with Project/Program focus and contributions given available funds. I think that 4.8 FTE and \$300-\$400 K per year to better reflect the scope of possible work. Evidently Congress may be trying to end this area of research. Even though the Renewable Fuel Standard 2 (which considers cellulosic biofuel) may be put in place fairly soon, I think there is a lack of information on ecological effects of those biofuels which must be considered in future reports to congress, and for regional consideration of the ecological effects of new potential biofuels crops. This is not a new FTE, but a continuation of the type of research conducted under the old sustainability program. It is unique in ORD in terms of producing information on terrestrial effects of cellulosic biofuels production as well as providing information on pollen production by those crops- which can have important health implications.

**ACE 079 Task 106 Reichman, Algal biofuels.**

The FTE of this task also can be modified to be more in context with Project/Program focus and contributions given available funds. I think that 1.0 FTE would better reflect the scope of current possible work. The extramural support could also be possibly be reduced. The research would be fine tuned in 2012 and then ramp up in succeeding out years; with some FTE moving from ACE Task 079 to this one. This task is unique in ORD in terms of looking at ecological effects of biofuels in terms of algal (and other possible microbes) interacting with natural systems. It complements Al-Abed's EB-2 task 054. However, please note that if biofuels FTE need to be removed from ACE, this task could possibly be under SSWR Project 2.2 (according to Walt) or possibly Systems in CSS (though only wildlife related eco work is really only included). In fact, if it was under water and had to absorb other FTE it could be expanded and perhaps started earlier.

**SHC 070 Task 426 Brookes**

From John Bolte. Was modified for spreadsheet.

A single unified platform suggests the SHCRP move towards a common, flexible community software architecture that can allow various groups and place-based studies to be more collaborative, take advantage of common tools and capabilities, and provide synergy between various efforts. This wasn't what was done in ESRP, and was one of the reasons ESRP was less than successful in achieving strong

collaborations and synergies between the various ESRP efforts, and that resulted in various disjoint tools that didn't build on each other. This is not to suggest that a single tool has to be used by all SHCRP groups; rather it suggests that a clear requirements process be undertaken early in SHCRP to identified key needed capabilities, existing tools be reviewed to determine alignment with these capabilities, and efforts be coordinated so that the software platform(s) developed/employed can take advantage of efforts across all of SHCRP related to data processing, modeling, and decision support.

### **SHC 137 Task 456 McKane**

More detailed responses to Kathryn's comments in italics:

*How does case study fit with project goals and overall SHC community classification and criteria for selecting locales?*

Although we have not selected specific communities at this early stage for the proposed Pacific Northwest (PNW) case study, we have a tentative list of candidate locales that are consistent with SHCRP community classification and selection criteria. For example, we are initially considering several coastal and inland PNW communities that are seeking to recover from a long history of unsustainable resource management practices in the fishing, agricultural and forest industries. Many rural PNW communities have been especially hard hit by loss of revenues, jobs, population, business infrastructure, etc., and by sociological problems that have accompanied the collapse of once thriving fisheries and forest industries. Specific candidate locales include a coastal Oregon community (e.g., Newport and Yaquina Bay estuary); a coastal Washington community (e.g., Skagit County); and various rural agricultural and forest communities in the Willamette River Basin.

Note that a case study or studies in any of these candidate locales would leverage existing expertise, databases, models, decision support tools, stakeholders and extramural collaborators developed under past and current PNW projects. For example, the Envision decision support framework is already being used by planning agencies and stakeholders in Skagit County, WA, and in the Willamette River Basin, OR, to address community sustainability issues. John Bolte will be presenting an SHC seminar within the next couple of weeks (date tbd) that will include a description of how planners and stakeholders in Skagit County and Willamette River Basin are currently using Envision to assist their planning decisions.

The PNW coastal and inland landscapes we are considering are excellent examples of locales facing a large number of sustainability challenges that potentially can be addressed through improved decision making and ecosystem management. With an anticipated doubling of the population in these locales over the next several decades, understanding the impacts of alternative growth management strategies on ecosystem services is vital to ensuring continued provision of ecosystem services. Similarly, the large base of fisheries, agricultural and forest resources in this region provides numerous opportunities for the development of sustainable management strategies that consider "bundles" of services for provision of food and fiber, clean water and air, biodiversity, recreation, etc. There is considerable local and regional interest in sustainable economic growth, as well as an emerging ecosystem service marketplace. The work we are proposing for a PNW case study would leverage and contribute to these existing and emerging community interests.

Finally, as described in our RAP3 proposal, the main purpose of a PNW case study is to establish an application architecture that will be applicable nationally across a wide variety of locations and scales. Given the opportunity to build on our existing PNW experience, data, tools and stakeholders, the work we propose can provide an efficient means of contributing to SHCRP national objectives in a realistic timeframe. This assumes tight collaboration with other SHC case studies, of course.

### *Large dollar cost.*

We proposed \$500k per year, but the scope and cost of this case study can be adjusted to available \$. For example, programmer contractors (2), postdocs (2), student service contractors (2), and workshops (2) could be reduced to half the proposed numbers by scaling back on: (1) the number of decision support tools and models compared (presently proposing Reva, Envision and Mimes), and/or (2) the number of focal communities within the PNW.

*Some excellent products anticipated.*

Outputs for a PNW case study will focus on economic, social and environmental sustainability indicators, particularly on tradeoffs among these “triple-bottom-line” indicators for alternative decision scenarios that communities may wish to consider. In this regard, WED is in the process of interviewing candidates for an Economist position, specifically to support the SHCRP Project 2 goal of developing benefit functions for valuating final ecosystem goods and services in monetary and nonmonetary terms and, ultimately, for assessing effects on human well being. Similarly, we are pursuing collaborative opportunities with sociologists in academia (e.g., Oregon State University’s Dr. Denise Lach and Dr. Sally Duncan) who are working on sustainability issues with economically distressed communities in rural Oregon. These developments should expedite our transition from ESRP to SHCRP.

*Should models be selected this soon?*

We are not proposing specific models at this point, but rather seek to develop a flexible application architecture that is capable of linking a wide variety of models. While we do have a number of existing models that can collectively address tradeoffs among a large suite of ecosystem services, our initial objective will be to establish an approach for interactively linking essentially any set of environmental, economic and sociological models/plugins within a flexible decision support framework.

### **SHC 196 Task 470 Schumaker**

(This is actually something he had sent to Andrew Geller. I have greatly modified for spreadsheet)

I have spent many years developing a flexible spatially-explicit individual-based model of wildlife population dynamics. The result (HexSim) is a good system for looking at stressor interactions, be they competition, predation, environmental stochasticity, pesticide applications, disease, human disturbance, etc. Its really a modeling environment. Users construct specific models with a range of complexity based on the problem at hand, data availability, and other concerns. HexSim is, for example, being used by the US FWS in the current round of recovery planning and critical habitat designation for the northern spotted owl.

The model is useful for a wide array of terrestrial wildlife species, and we have a proof of concept aquatic extension for fish. (But that would take a while to fully develop.) One of the principal agency drivers for the work was the need to evaluate the impacts that regulated pesticides have on threatened and endangered wildlife populations. There is a task in the CSS multi-year plan to do just this.

Because the model is flexible, spatially-explicit, and individual-based, and because each individual can have traits that vary with time, exposure, experience, based on genotypes, etc, it ends up being a powerful platform for simulating disease dynamics. I have developed several purely theoretical demonstrations of its utility to study disease dynamics. But I've only just started one real case study, with group at Oregon State University. That lab is working on the chytrid fungus (*Batrachochytrium dendrobatidis*) and amphibians. I'm helping them set up a simulation of the fungal invasion of a network of ponds inhabited by cascade frogs.

There is concern in the scientific community that many zoonotic diseases are on the rise, and that human disturbance might be attributed to this trend. Lyme disease provides a good example. The prevalent theory is that Lyme disease was traditionally kept endemic because complex wildlife communities contained a number of intermediate hosts that could not transmit the disease. Human encroachment has lowered biodiversity, and this process tends to select for “competent” hosts -- those who can transmit the disease. Accompanying the loss of biodiversity, and the loss of incompetent hosts, is a growing presence of humans around the perimeter of natural areas. Together, these processes have led to disease outbreaks. This is an oversimplification, and HexSim is not necessarily the model you'd want to study a community ecology problem such as this. But I think this illustrates how land use policy can indirectly influence the prevalence of a pathogen that has significant impact to human health.

There are not really any other models available that can perform this type of simulation. RAMAS GIS is the most popular, but besides being very costly, its not spatially explicit or individual-based. And it

assumes a meta-population dynamic, which is uncommon in nature. Vortex is more realistic, but not spatially-explicit. And its designed for studying populations in the grips of an extinction vortex (hence the name). I say this only to make the point that not much sophisticated landscape-scale modeling has been done with wildlife diseases, and even less has been done with zoonotic diseases. The tools necessary to do so have simply not been available.

So this project would begin by demonstrating what can be done with HexSim, and what cannot. This would be basic applied research. My work and reading thus far has demonstrated that there is a significant contribution here waiting to be made. And it will be a big leap from the SEIR (susceptible, exposed, infected, recovered) models that still represent the state of the art in many circles. Transitioning from this basic applied research to conversations with stakeholders is a ways off. But that's to be expected. Nevertheless, the overall goal is to look for ways to minimize human exposure to such pathogens, and keeping them endemic is a big part of that equation. This project, as I've mentioned, also has the potential to forge a strong link to both the CSS MYP and the ecosystem services work being conducted under SHC.

Getting back to your questions... zoonotic diseases are simply those class of diseases that can be spread from wildlife to humans. Some are vector-borne and others aren't. I believe more than half of the pathogens known to affect humans are zoonotic. USGS has a research program in this area ([http://health.usgs.gov/vector\\_zoonotic/](http://health.usgs.gov/vector_zoonotic/)), but EPA does not (at least, not that I'm aware of). There was a related focus within the Human Health and Biodiversity component of ESRP, but I think that effort has been retired.

Regarding the valuation of ecosystem services -- yes, the ability of the environment to hold a pathogen in check (keep it endemic) is a critical ecosystem service that has never been bundled in a credible way, to my knowledge. This would make an excellent contribution to the ES component of SHC, which I'm already involved in. Yes, Avian flu, West Nile Virus, and Lyme disease are huge issues, and household terms. I don't know that any of these are ideal systems for the modeling platform I'm working with. The first two are planetary in scope, and Lyme disease is really a community ecology problem. The prairie dog, black-footed ferret, and sylvatic plague problem is an example where we could connect with OPP and CSS. That's why I suggested it be the starting point. I'm certainly happy to revisit that issue.

Basically, I see this work as a powerful extension of the research I'm already involved in, and as a way to link the CSS and SHC multi-year plans. It can add an important dimension to EPA's ES-related research, and will contribute basic applied theory that contributes to our understanding of stressor interactions and their consequences for humans and the environment. Its also low cost to the agency, since the model development work has already been done.

I think I'll stop here. I hope this provides some useful background, and a little more insight into what I'm thinking. Its a new area of research for me, so I don't have any papers of my own to cite yet.

#### **CSS 155 Task 321 Nathan Schumaker**

No comments received. On Storyboard Systems p. 17

#### **CSS 064 Task 348 Steve Diamond Lead**

No comments received. This task includes WED research On Storyboard Systems p. 19